

HERPETOFAUNA OF THE EXMOUTH REGION, WESTERN AUSTRALIA

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INTRODUCTION

This paper is essentially an annotated list of the 114 species of amphibians and reptiles inhabiting the North West Cape peninsula, Exmouth Gulf and adjacent lands and seas. For our purposes the Exmouth region is delimited in the south by latitude 23°S and in the east by longitude 114°45'E. Brief notes are given on the local distribution of each taxon and its abundance and habitat preferences. Finally there is a discussion on the faunistics of the region, including a comparison with the herpetofauna of Shark Bay. To avoid confusion between two well-separated localities, 'Yardie Creek' in this paper means the watercourse; when we refer to the former Yardie Creek sheep station we simply call it 'Yardie'.

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COLLECTIONS

It has taken a long time for the rich herpetofauna of the Exmouth region to become known. The first collections were made in 1933-35 by R. Ammon at Marrilla; his specimens included several undescribed species, e.g. *Ctenotus hanloni* and *C. calurus*, but this was not appreciated at the time. In winter 1959, A.M. Douglas and G.F. Mees collected at Yardie, Point Cloates and Learmonth. G.M. Storr and B.T. Clay briefly visited the region in October 1961 and November 1962; they concentrated on agamids, especially the *Amphibolurus maculatus* group. In August 1962, T.M. Scott collected at Ningaloo and Bullara, and a few years later D.G. Bathgate collected around Exmouth. In the course of collecting mammals jointly for the Western Australian Museum and the American Museum of Natural History, W.H. Butler obtained many

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reptiles on Yardie in June and July 1963. In June 1970, W.K. Youngson and R.I.T. Prince visited the Muiron Is, the largest islands in the region. In August 1973, R. Rowe made a small but valuable collection of sea snakes. In August-September 1975, T.M.S. Hanlon collected and observed reptiles at Yardie Creek, Exmouth, Bullara and Shothole Canyon. By the end of 1975 most of the common and easy-to-find species had been collected, and the regional list stood at 91 species.

Intensive field work began in March 1976 when G. Harold and G. Barron collected frogs and reptiles at Yardie, Vlaming Head, Exmouth and Shothole Canyon. They added four species to the list: *Neobatrachus centralis*, *Diplodactylus elderti*, *D. taeniatus* and *Delma pax*. A grant from Mr and Mrs W.H. Butler allowed the Museum to put two parties in the field in December 1978: T.M.S. Hanlon and D. Knowles collected throughout the region and obtained the first local examples of *Diplodactylus squarrosus*, *Rhynchoedura ornata*, *Cryptoblepharus carnabyi*, *Ctenotus colletti rufescens*, *C. duricola*, *Lerista praepecta*, *Varanus eremius*, *V. gouldii* and *Typhlina diversa*; and G. Harold and G. Barron, while primarily engaged in trapping small mammals, were able to collect many reptiles in the Cape Range and its vicinity, including the first *Aprasia rostrata fusca*, *Lerista elegans* and *L. nichollsi*. In April-June 1979, T.M.S. Hanlon returned to the far south-east of the region and obtained the first regional specimens of *Chelodina steindachneri*, *Amphibolurus scutulatus*, *Ctenotus piankai*, *C. schomburgkii*, *C. u. uber*, *Egernia depressa* and *Varanus panoptes rubidus*.

Other people whose specimens contributed to this report are I. Abbott, Dr Atkins, W.G. Bocksette, F. Barrett-Lennard, S. Bartlett, A. Baynes, J.H. Calaby, M. DeGraaf, P.A. Cawthorne, P.J. Fuller, S.R. Gare, R. Gedling, G. Hitchins, R.B. Humphries, C.F.H. Jenkins, R.E. Johnstone, G. Kendrick, A.G. Kluge, L.E. Koch, N. Kolichis, K.A. Lance, M. Lane, N.M. Milward, Mr Richies, J. Seabrook, L.G. Smith, N. Smith, A. Snell, M. Stott, R. Thomas, A.G. Wells, G.P. Whitley and B.R. Wilson.

ENVIRONMENT

The region lies entirely within the arid zone, mean annual rainfall ranging from 22 cm in the south-east to ca 35 cm in the Cape Range. On the west coast most rain falls in winter and autumn; elsewhere most in summer and autumn. Summers are very hot in the eastern interior with mean daily maximum temperature in January ca 40°C; the west coast is much cooler with mean daily maximum temperature in January ca 32°C. Away from the Cape Range, relief is gentle and elevation is mostly less than 100 m above the sea. The region is divisible into four zones, two of which are easily defined. The other two, the

eastern and western lowlands, merge into each other in about the longitude of Bullara.

West coast

The narrow strip of country close to the west coast (south of Vlaming Head) is considerably cooler in summer and wetter in winter than other parts of the region. The white calcareous sands of the coastal dunes are sparsely vegetated with the tussock grass *Spinifex longifolius* and low sprawling shrubs such as *Nitraria schoberi* and *Acanthocarpus preissii*. Characteristic reptiles are *Diplodactylus rankini*, *Amphibolurus p. parviceps*, *Lophognathus g. gilberti*, *Lerista elegans*, *Morethia lineocellata* and *Vermicella littoralis*.

Cape Range

This is essentially a heavily dissected limestone plateau rising to 315 m. The steep rocky slopes are sparingly covered with *Triodia*, shrubs and low eucalypts. The bottoms of gorges are more heavily wooded. The fauna is somewhat impoverished. However four species are regionally confined to the range: *Pseudophryne douglasi*, *Diplodactylus elderi*, *D. mitchelli* and *Delma pax*.

Eastern lowlands

East of Giralalia there is a large area of red sandridges; these and sandy interdunes carry *Triodia*, *Owenia reticulata*, *Grevillea eriostachya*, *Acacia pyrifolia* and small shrubs. On clayey interdunes and plains *Triodia* is replaced with soft grasses, and mixed shrubbery with open *Acacia* scrubs. Watercourses and low lying areas (claypans) are margined with *Eucalyptus camaldulensis*. Regionally confined to the eastern lowlands are *Chelodina steindachneri*, *Rhynchoedura ornata*, *Amphibolurus isolepis rubens*, *Amphibolurus scutulatus*, *Ctenotus calurus*, *C. piankai*, *C. hanloni*, *C. schomburgkii*, *C. u. uber*, *Egernia depressa*, *Varanus caudolineatus* and *V. panoptes rubidus*.

Western lowlands

Under this heading we include the rest of the region. At the inland foot of the west-coastal dunes there are frequently samphire flats. These quickly give way to an undulating, treeless belt of shallow red sands and clays over limestone (which is exposed on rises and along watercourses). The sandier country is dominated by *Triodia* and a variety of shrubs including *Banksia ashbyi*. The heavier soils are dominated by *Acacia* scrubs. Watercourses are lined with *Eucalyptus camaldulensis* and *Erythrina vespertilio*, and *Ficus platypoda* grows on limestone outcrops. This zone is especially rich in agamid lizards, including *Amphibolurus maculatus badius*, *A. femoralis*, *A. i. isolepis*, *A. clayi* and *Moloch horridus*.

ANNOTATED LIST

Leptodactylidae

Cyclorana maini Tyler & Martin

Collected in summer (December-March) at Exmouth and in the claypan country of the eastern lowlands (Koordarrie, Winning).

Neobatrachus centralis (Parker)

G. Harold and G. Barron collected seven specimens at Exmouth in early March 1976; the frogs were feeding at night on a road and on the airstrip.

Pseudophryne douglasi Main

In our region confined to the Cape Range. In June 1955, A.M. Douglas collected the first known examples of this peculiar frog at a spring in Shothole Canyon; his specimens comprised eggs, larvae and five adults (only the last were retained by L. Glauert). At the same locality A.G. Kluge and J.H. Calaby found larvae on 1 August 1961, and G. Kendrick and G. Hitchin, adults and larvae on 17 May 1965. A.R. Main (1964) believes that this relict species depends on early winter rains for its breeding.

Hylidae

Litoria rubella (Gray)

This ubiquitous frog is no doubt common about claypans and watercourses in the east, despite there being only one record from the area, namely three specimens collected by G.M. Storr and B.T. Clay on the evening of 3 November 1961 at a water-trough 8 km E of Giralia.

Cheloniidae

Caretta caretta (Linnaeus)

On 12 June 1970, W.K. Youngson and R.I.T. Prince collected two hatching loggerheads outside a nest in the dunes on the east side of South Muiron I.; tracks of other hatchlings led down to the sea.

Chelonia mydas (Linnaeus)

Judging from the number of specimens in the Museum (15), the Green Turtle is the most plentiful turtle in the region. They nest in summer on west-coastal beaches between North West Cape and Yardie Creek (A.A. Burbidge, pers. comm.).

Eretmochelys imbricata (Linnaeus)

Carnarvon fisherman D. Wellington told Dr A.A. Burbidge that he had found Hawksbill Turtles nesting in a sandy bay 5 km south of Yardie Creek in summer 1977-78 (A.A. Burbidge, pers. comm.).

Cheluidae

Chelodina steindachneri Siebenrock

One record from the eastern lowlands: adults and juveniles were seen by T.M.S. Hanlon on 4 June 1979 in a dam 24 km west of Marrilla; one of them was collected.

Gekkonidae

Crenadactylus ocellatus horni (Lucas & Frost)

Moderately common in south-west from Yardie Creek to Ningaloo in *Triodia* on near-coastal sandplains and in the *Spinifex longifolius* of white coastal dunes. Also among rocks and *Triodia* in the Cape Range (Shothole Canyon).

Diplodactylus ciliaris Boulenger

Regionally confined to the peninsula, i.e. the west-coastal plain south to Yardie Creek, the Cape Range south to 40 km north-east of Ningaloo, and the east-coastal plain south to Exmouth. Moderately common in acacias and other trees and shrubs.

Diplodactylus conspicillatus Lucas & Frost

Lowlands west to the eastern foot of the Cape Range, north on the peninsula to Exmouth. Moderately common. Mainly on heavy or stony red soils carrying acacias and other shrubs.

Diplodactylus elderi Stirling & Zietz

One record: a specimen collected by G. Harold and G. Barron at Shothole Canyon in March 1976. Here the ground was stony and the vegetation open mallee over *Triodia*.

Diplodactylus mitchelli Kluge

Regionally confined to the Cape Range. Moderately common on stony ground at Shothole Canyon. A female (R52929) laid two eggs after its capture by G. Harold and G. Barron on 10 March 1976.

Diplodactylus ornatus Gray

This gecko almost certainly reaches the region. One was collected on 31 October 1961 in sand dunes at Maud Landing on the west coast 13 km beyond our southern boundary. A specimen (R11515) is registered as coming from the Learmonth district, but as the same collection includes an *Amphibolurus cristatus*, its provenance could be questioned. We cannot find a specimen (R13220) from Yardie that L. Glauert registered as '*D. vittatus*'.

Diplodactylus pulcher (Steindachner)

Eastern lowlands near Bullara and west of Giralia. Uncommon. Red clayey plains vegetated with open *Acacia* scrub, a habitat it shares with the more plentiful *D. squarrosus*.

Diplodactylus rankini Storr

Confined to the west coast north to Yardie Creek. Moderately common in trees and shrubs of white coastal dunes, a habitat that it shares with the closely related *D. ciliaris*. Endemic to the region, where it replaces the closely related *D. spinigerus* of south-western Western Australia. [The specimen of '*D. spinigerus*' from Point Cloates (Kluge 1967: 1062) is in fact a *rankini*.]

Diplodactylus squarrosus Kluge

Eastern lowlands. Moderately common between Bullara and Giralia on red clayey plains carrying open *Acacia* scrub.

Diplodactylus stenodactylus Boulenger

Widespread in lowlands, but not recorded from the Cape Range. Moderately common. All kinds of country (sandy, clayey, stony and rocky) vegetated with *Triodia*.

Diplodactylus strophurus (Duméril & Bibron)

Widespread in eastern and central zones, west to Vlaming Head, but not recorded from the Cape Range or the west-coastal plains. Common. Foraging on the ground and in low vegetation (shrubs, small trees, *Triodia* and *Spinifex longifolius*) on sandy and clayey soils.

Diplodactylus taeniatus (Lönnberg & Andersson)

Locally restricted to far north of peninsula. Common in *Triodia* in red sand dunes at Vlaming Head. Also a specimen collected in *Triodia* at Exmouth.

Gehyra pilbara Mitchell

Within the region it has only been collected on the Muiron Is and the peninsula (in the Cape Range as well as on the coastal plains). Moderately common in stony country.

Gehyra punctata (Fry)

Locally recorded only on the Muiron Is, where W.K. Youngson and R.I.T. Prince collected three specimens on 12 June 1970.

Gehyra variegata (Duméril & Bibron)

Widespread in lowlands. Very common in shrubs and trees in most habitats. At Yardie Creek it is confined to the white coastal dunes; rocky habitats along the watercourse are occupied by its congener *G. pilbara*.

Heteronotia binoei (Gray)

Common and widespread in the west. Reported from the Muiron and Anchor Is but not as yet from the deserts around Giralia and Marrilla.

Nephrurus levis occidentalis Storr

Widespread in lowlands. Moderately common. Mainly in red sand dunes and interdunes; also in white coastal dunes and on clayey soils. Here, in the absence of congeners, its habitat preferences are broad.

Rhynchoedura ornata Günther

Eastern lowlands, about Giralia and Marrilla. Locally common. Red clays and sands carrying acacias and spinifex.

Pygopodidae

Aprasia rostrata fusca Storr

Probably widespread, judging from the two very different habitats it has been found in to date. On 8 December 1978 G. Harold and G. Barron collected one in leaf litter beneath an acacia tree growing in white sand dunes at the mouth of Yardie Creek. In the late afternoon of 14 December 1978, T.M.S. Hanlon and D. Knowles dug three specimens from the top of a red spinifex-covered sand-ridge 3 km NW of Bullara. Endemic to the region.

Delma nasuta Kluge

Widespread in sandy lowlands. Found in the *Triodia* of red sandridges and sandplains and in the *Spinifex longifolius* of white coastal dunes.

Delma pax Kluge

One record from the Cape Range; two specimens found by G. Harold and G. Barron under dead *Triodia* at Shothole Canyon on 10 March 1976.

Delma tincta DeVis

Eastern and central zones, west to Shothole Canyon. Scarce.

Lialis burtonis Gray

Common and widespread in sandy lowlands.

Pygopus nigriceps (Fischer)

Eastern lowlands. Scarce. There is a specimen in the University of Michigan from 80 km south of Exmouth Gulf HS (Kluge 1974) and three in the Western Australian Museum from Marrilla.

Agamidae

Amphibolurus caudicinctus (Günther)

Only recorded from the Muiron Is, a single specimen obtained by W.K. Youngson and R.I.T. Prince on 12 June 1970.

Amphibolurus clayi Storr

Central zone (lowlands at 5 km south of Learmonth, 1 km north of Bullara, 22 km west of Giralia and 50 km north of Warroora). Scarce. Among *Triodia* on red soils (clayey as well as sandy).

Amphibolurus femoralis Storr

Lowlands (north to Vlaming Head and west to the Minilya-Exmouth road) and dunes on the plateau of Cape Range east of Yardie Creek. Common. Main-

ly the crests of red sandridges; also interdunes (clayey as well as sandy, provided *Triodia* is present).

Amphibolurus inermis (DeVis)

Widespread in lowlands, but absent from the Cape Range. Very common. Mainly in sandy country; also on heavy soils.

Amphibolurus isolepis isolepis (Fischer)

Western lowlands, east to Bullara. Common in eastern part of range; uncommon and patchily distributed towards west coast (the stronghold of *A. maculatus badius*). Red clayey, sandy and stony soils with scattered tussocks of *Triodia* and other grasses.

Amphibolurus isolepis rubens Storr

Eastern lowlands, west to Giralia. Common. Red sandplains and red sandy or clayey interdunes with scattered tussocks of *Triodia*. In view of the great size difference between adults of *rubens* and the preceding taxon, it is doubtful whether they are conspecific.

Amphibolurus maculatus badius Storr

South-western part of region, north to Ningaloo and east to the Minilya-Exmouth road (30 km SSW of Bullara). Common. Near-coastal sandplains and interdunes with low open vegetation especially *Triodia*.

Amphibolurus minor minor Sternfeld

Common in western lowlands north to Yardie and Exmouth, mainly on rolling sandplains with *Triodia* and low open shrubbery. Also far south-east (two specimens from Marrilla and one from 25 km NNW of Winning).

Amphibolurus parviceps parviceps (Storr)

West coast north to 9 km north of Yardie Creek. Common. White coastal dunes with *Spinifex longifolius* and other low open vegetation; occasionally among *Triodia* on adjacent sandplains (the stronghold of *A. maculatus badius*).

Amphibolurus reticulatus (Gray)

Eastern and central zones (i.e. absent from west-coastal plains). Common. Mainly red clayey soils with open *Acacia* scrub.

Amphibolurus scutulatus Stirling & Zietz

Recorded only from far south-east: in early May 1979 T.M.S. Hanlon found it common on a red loamy plain with open *Acacia* scrub 25 km NNW of Winning.

Diporiphora winneckei Lucas & Frost

Eastern (Bullara, Giralia, Marrilla etc.); also Vlaming Head. Moderately common. Among *Triodia*, mainly on red sandridges, but also on sandy and clayey interdunes.

Lophognathus gilberti gilberti Gray

Patchily distributed on west coast north to North West Cape (collected at

Neds Well, Tantabiddi Creek, Ningaloo and just south of our region at Coral Bay and 5 km north of Maud Landing). Also observed by T.M.S. Hanlon in mangroves on the Sandalwood Peninsula.

Lophognathus longirostris Boulenger

Widespread but only common on the east-coastal plains of the peninsula; scarce elsewhere. Wooded habitats, especially in gullies or along watercourses.

Moloch horridus Gray

Uncommon. One record from the far south-east (4 km west of Marrilla); the rest from the Minilya-Exmouth road, north to Learmonth.

Scincidae

Carlia foliorum (DeVis)

Cape Range and western lowlands south to Yardie Creek and Bullara. Uncommon. Among *Triodia*, low bushes and leaf litter, especially on heavy soils and among rocks.

Cryptoblepharus carnabyi Storr

One record: T.M.S. Hanlon and D. Knowles collected one in a thicket at the foot of a cliff in Mandu Mandu Gorge.

Cryptoblepharus plagiocephalus (Cocteau)

Two records from west coast: one specimen from Yardie and one from a limestone outcrop 13 km N of Cardabia.

Ctenotus calurus Storr

One record: a specimen collected by R. Ammon at Marrilla in 1935.

Ctenotus colletti rufescens Storr

Only known from four specimens collected by T.M.S. Hanlon and D. Knowles in December 1978 in and near red sand dunes at Vlaming Head and 3 km E of Giralia. A specimen was pit-trapped at Yardie Creek but discarded by G. Harold and G. Barron because of ant-damage (before which it was identified by T.M.S. Hanlon). Among *Triodia* on dunes, clayey interdunes and sandplains. Endemic to the region.

Ctenotus duricola Storr

Only collected at Yardie Creek and 22 km west of Giralia. Among *Triodia* on clayey or stony soils.

Ctenotus grandis Storr

Western lowlands: coastal plains of the peninsula south to Yardie Creek and Exmouth. Moderately common. Among *Triodia* on reddish sands and loams.

Ctenotus hanloni Storr

Eastern lowlands (around Bullara, Giralia and Marrilla). Moderately com-

mon. Among *Triodia* on reddish sandplains and reddish clayey, loamy and sandy interdunes. In burnt country 22 km NNW of Giralia seven specimens were dug from small burrows beneath burnt clumps of *Triodia*.

Ctenotus helenae Storr

Eastern lowlands west to Giralia; also observed by T.M.S. Hanlon at Vlaming Head. Moderately common. Among *Triodia*, *Acacia* and eucalypts growing on interdunal red clay flats and sandy and loamy plains.

Ctenotus iapetus Storr

Lowlands, but not the west coast south of Yardie Creek. Common. Among *Triodia* on red sandridges and adjacent clayey interdunes. Endemic to the region.

Ctenotus pantherinus ocellifer (Boulenger)

Lowlands, but not the west coast south of Yardie Creek. Common. Among *Triodia*, mainly on red clayey plains or interdunes, occasionally on red sand dunes and sandplains.

Ctenotus piankai Storr

One record from far south-east: a specimen collected by T.M.S. Hanlon on a red sandplain with eucalypts and *Triodia* at Marrilla homestead on 18 May 1979.

Ctenotus saxatilis Storr

Most of the region, including the Muiron Is but not sandy deserts. Very common. In a wide range of habitats, but preferring heavy soils to light, and *Triodia* to other vegetation.

Ctenotus schomburgkii (Peters)

Eastern lowlands (around Bullara, Giralia and Marrilla). Uncommon. In *Acacia* scrubs or *Triodia* on red clayey, loamy and stony soils.

Ctenotus uber uber Storr

Locally confined to far east. Common. Open *Acacia* scrub on red loamy plains.

Egernia depressa (Günther)

One record from far south-east: a specimen found by T.M.S. Hanlon in a dead tree trunk in open *Acacia* scrub 25 km NNW of Winning on 5 May 1979.

Eremiascincus fasciolatus (Günther)

Eastern lowlands (around Giralia and Marrilla) and at Vlaming Head. Scarce. Among *Triodia* on red sand dunes.

Eremiascincus richardsonii (Gray)

Western lowlands, including east-coastal plains of the peninsula. Uncommon. In coastal dunes and near-coastal limestone.

Lerista bipes (Fischer)

Mainly the eastern lowlands, but also the northern coastal plains of the peninsula (south in the west to Milyering Well, and in the east to Exmouth). Common. Red sandy and loamy soils with sparse vegetation, especially *Triodia*.

Lerista elegans (Gray)

Only recorded from the white coastal dunes near the mouth of Yardie Creek and red coastal dunes at Vlaming Head. Uncommon. In *Spinifex longifolius* and *Triodia* and among *Acacia* leaf litter.

Lerista lineopunctulata (Duméril & Bibron)

West coast north to North West Cape. Common. Most specimens were dug from under acacias in white dunes, but also found under *Triodia* in red dunes at Vlaming Head.

Lerista macropisthopus (Werner)

Only recorded from west coast at or near Yardie Creek. Scarce. One of the specimens was pit-trapped in heavy reddish soil with open *Triodia*.

Lerista muelleri (Fischer)

Patchily distributed in lowlands. Uncommon. Under *Triodia* and leaf litter.

Lerista nichollsi (Loveridge)

Patchily distributed in lowlands. Uncommon. Red dunes and interdunes of eastern zone, near-coastal reddish sandplains, and white coastal dunes.

Lerista planiventralis (Lucas & Frost)

Regionally there are two forms of this lizard. First, that inhabiting the white coastal dunes at Yardie Creek and 15 km further south; it has 22 rows of midbody scale rows, the sides of body white and the back very pale greyish brown. Second, the form from the spinifex-covered red dunes near Bullara and Marrilla; there the number of midbody scale rows is 20, the sides of body pinkish white and the back reddish brown. Material is required from intermediate localities for determining the taxonomic status of these forms. Both forms are moderately common.

Lerista praepedita (Boulenger)

Locally known only from near the mouth of Yardie Creek, where it is moderately common under *Spinifex longifolius* and *Acacia* leaf litter in white coastal dunes.

Menetia greyii (Gray)

Patchily distributed in lowlands, but not in vicinity of west coast (the stronghold of *M. surda*). Uncommon. In leaf litter and among *Triodia* and other tussock grasses growing on red clays and loams.

Menetia surda Storr

Common on west coast (north to Yardie), mainly among *Triodia* on near-

coastal sandplains, but also under *Spinifex longifolius* on white coastal dunes. One record from 20 km NW of Giralia, a specimen collected in *Triodia* on heavy red soil.

Morethia lineocellata (Duméril & Bibron)

West coast, north to Vlaming Head. Common. Coastal sand dunes (white and red) and near-coastal sandplains, mainly among *Triodia*.

Morethia ruficauda exquisita Storr

Widespread but patchily distributed. Moderately common. Among *Triodia*, rocks and *Acacia* leaf litter, mainly on clayey and stony soils.

Notoscincus ornatus ornatus (Broom)

Lowlands west to Vlaming Head (i.e. absent from Cape Range and west-coastal plains). Common. Among *Triodia* on red dunes and red clayey plains and interdunes.

Omolepida branchialis (Günther)

Cape Range and western lowlands east to Exmouth and Bullara. Common in coastal dunes and near-coastal sandplains; scarce inland. Mainly among *Triodia*.

Sphenomorphus isolepis isolepis (Boulenger)

Regionally known only from the Muiron Is, where W.K. Youngson and R.I.T. Prince collected four specimens in June 1970.

Tiliqua multifasciata Sternfeld

Patchily distributed in lowlands. Scarce.

Varanidae

Varanus acanthurus Boulenger

Lowlands, including the Muiron Is. Stony and clayey plains. Uncommon.

Varanus brevicauda Boulenger

Sandy country vegetated with *Triodia* (recorded from Vlaming Head, Ningaloo, Bullara and Marilla). Scarce.

Varanus caudolineatus Boulenger

Only recorded from far east, around Marilla. Scarce. *Acacia* scrubs.

Varanus eremius Lucas & Frost

Only two records: specimens collected by T.M.S. Hanlon and D. Knowles in December 1978. One was chased into a burrow in a spinifex-covered interdune at Vlaming Head; the other was collected at Giralia among *Acacia* and *Triodia* on heavy red soil.

Varanus giganteus (Gray)

Western lowlands. Uncommon. Mainly in rocky country.

Varanus gouldii (Gray)

Eastern and central lowlands west to Vlaming Head. Uncommon. Mainly in sandy country.

Varanus panoptes rubidus Storr

Eastern lowlands (around Giralia and Marrilla). Uncommon. Red clayey soils with *Acacia* over *Triodia*.

Varanus tristis tristis (Schlegel)

The only local record is a specimen collected by D.G. Bathgate, presumably in the vicinity of Exmouth.

Typhlopidae

Typhlina diversa (Waite)

Regionally known only from coastal lowlands near Yardie Creek and between Exmouth and Learmonth. Scarce. Collected on red sandy and clayey soils and on a saltpan.

Typhlina nigroterminata (Parker)

Normal specimens of this blind snake have been collected in the eastern and central lowlands west to Vlaming Head. A specimen from Cape Range (R25101) is more like *T. affinis* in the shape of its rostral and its relatively short snout.

Boidae

Aspidites melanocephalus (Krefft)

Two records: a specimen collected at Yardie and a head collected presumably at Learmonth.

Liasis childreni Gray

Regionally known from six specimens from the coastal plains of the peninsula between Tantabiddi Well and Learmonth.

Liasis perthensis Stull

Regionally known from three specimens collected near North West Cape (Vlaming Head and Neds Well).

Elapidae

Acanthophis pyrrhus Boulenger

Patchily distributed in lowlands. Uncommon. Among *Triodia* on sandy, stony and clayey soils.

Demansia olivacea calodera Storr

Moderately common on west-coastal plains and dunes, north to Vlaming Head. Elsewhere only recorded in far south-east (Marrilla).

Demansia reticulata cupreiceps Storr

Moderately common in eastern and central lowlands west to North West Cape; also an observation by T.M.S. Hanlon of one among limestone rocks and *Triodia* at Yardie Creek. To a large extent the ranges of the two whipsnakes (*Demansia* spp.) seem to be mutually exclusive in this region.

Denisonia fasciata Rosén

Regionally known only from three specimens, collected at Exmouth, Rough Range and Marrilla.

Denisonia punctata Boulenger

Regionally known only from the far south-east (Marrilla district): a specimen collected by R. Ammon in 1935, and one found dead in May 1979 by T.M.S. Hanlon.

Furina christieana (Fry)

The four specimens in the Western Australian Museum came from the coastal plains of the peninsula between Yardie and Learmonth.

Pseudechis australis (Gray)

Western lowlands. Moderately common.

Pseudonaja modesta (Günther)

East-coastal plains of the peninsula and eastern lowlands (especially the spinifex-covered sandplains around Marrilla and Winning). Moderately common.

Pseudonaja nuchalis Günther

Widespread in lowlands. Common.

Vermicella approximans (Glauert)

One record: a specimen collected by M. DeGraaf at Bullara on 1 January 1970.

Vermicella bertholdi (Jan)

One record from far south-east: a specimen collected by R. Ammon at Marrilla in 1934.

Vermicella littoralis Storr

Western lowlands. Moderately common near coast.

Hydrophiidae

Aipysurus apraefrontalis M.A. Smith

The Western Australian Museum has five specimens from Exmouth Gulf, all but one taken by prawn trawlers in winter.

Aipysurus duboisii Bavay

The two specimens in the Western Australian Museum were collected in

Exmouth Gulf by prawn trawlers in winter; one of them was taken at eight fathoms.

Aipysurus eydouxii (Gray)

A sea snake from Exmouth Gulf (R47749) was tentatively identified by L.A. Smith with this species.

Aipysurus laevis laevis Lacépède

There are two specimens in the Western Australian Museum from off Locker I., two from Exmouth Gulf, and one trawled in eight fathoms off Sunday I.

Astrotia stokesii (Gray)

The only regional record is a specimen collected by R. Rowe in August 1973; it was trawled at eight fathoms off Sunday I. (south-east of the Muiron Is).

Ephalophis greyii M.A. Smith

In October 1978, N. Kolichis collected two specimens in mangrove creeks near Learmonth; one of the snakes was searching the burrows of mud-skippers (Gobiidae). R. Ammon's specimen from 'Marrilla' probably came from Exmouth Gulf.

Hydrophis elegans (Gray)

In the Western Australian Museum are seven specimens trawled at eight fathoms off Sunday I. and one from North West Cape.

Hydrophis major (Shaw)

R. Rowe collected three specimens in August 1973; they were trawled at eight fathoms off Sunday I.

Hydrophis ocellatus (Gray)

Two of the specimens in the Western Australian Museum were collected near Sunday I.; the other was taken by prawn trawlers in Exmouth Gulf.

DISCUSSION

Freshwater habitats have been somewhat neglected and further work, especially in the eastern lowlands, should add some leptodactylid frogs. As it is, the list is formidable with 49 genera and 114 species, distributed among 13 families as follows:

Leptodactylidae—3 genera, 3 species.

Hylidae—1 genus, 1 species.

Cheloniidae—3 genera, 3 species.

Cheluidae—1 genus, 1 species.

Gekkonidae—6 genera, 18 species.

Pygopodidae—4 genera, 6 species.

Agamidae—4 genera, 15 species and subspecies.

Scincidae—12 genera, 34 species.

Varanidae—1 genus, 8 species.

Typhlopidae—1 genus, 2 species.

Boidae—2 genera, 3 species.

Elapidae—7 genera, 12 species.

Hydrophiidae—4 genera, 9 species.

It is instructive to compare these counts with those made by Storr & Harold (1978) for the Shark Bay region, nearly 4 deg. of latitude further south on the west coast of Western Australia (noting that *Physignathus longirostris* is now in the genus *Lophognathus*, and *Sphenomorphus richardsonii* in *Eremiascincus*). Overall diversity is greater in the Exmouth region, owing largely to the increase in species and genera of such predominantly tropical groups as the monitors, pythons, sea snakes and marine turtles. Geckos and agamids are more diverse in the Exmouth region, but skink and elapid totals are much the same. Pygopodids are considerably less diverse in the Exmouth region, which is to be expected as we move away from the south-west of Western Australia, the stronghold of this relict family.

Together the two regions support a herpetofauna of *ca* 150 species. However only 59 species are shared. In other words almost half of the species of the Exmouth region do not extend to Shark Bay, and *vice versa*. This rate of turnover is characteristic of most families, e.g. 9 of 18 Exmouth geckos, 8 of 15 Exmouth agamids and 17 of 34 Exmouth skinks fail to reach Shark Bay. Within families there can be considerable differences between genera in turnover of species and subspecies. Whereas 7 of 8 Exmouth *Lerista* are shared with Shark Bay, only one of 11 *Ctenotus* is shared.

The high turnover in *Ctenotus* is due to the presence in the Exmouth region, but not at Shark Bay, of large areas of red sandridges and other desert habitats very like those of the eastern interior of Western Australia. Here are found such desert taxa as *Ctenotus calurus*, *C. hanloni*, *C. helenae*, *C. pantherinus ocellifer* and *C. piankai* or derivatives of desert taxa such as *Ctenotus colletti rufescens* (from *C.c. nasutus*) and *C. iapetus* (from *C. quattuordecimlineatus*). Other desert reptiles occurring in the Exmouth region but not at Shark Bay include *Diplodactylus conspicillatus*, *D. elderi*, *D. taeniatus*, *Amphibolurus clayi*, *A. i. isolepis*, *Diporiphora winneckei*, *Ctenotus grandis*, *Eremiascincus fasciolatus*, *Lerista bipes*, *Varanus brevicauda* and *Acanthophis pyrrhus*. The desert species are especially characteristic of the eastern lowlands, but several of them are also found in the red coastal dunes at Vlaming Head (whether the latter reached Vlaming Head *via* the eastern lowlands or *via* a route now submerged by postpleistocene seas has still to be ascertained).

Also present in the Exmouth region but not at Shark Bay are such Pilbara endemics as *Pseudophryne douglasi*, *Diplodactylus mitchelli*, *Delma pax*, *Amphibolurus c. caudicinctus*, *Ctenotus duricola* and *Liasis perthensis*. To these we could add five taxa, whose distribution is centred on the Pilbara but

which extend to southern Kimberley (*Gehyra pilbara* and *Ctenotus saxatilis*) or to the southern interior of the North-west Division (*Gehyra punctata*, *Morethia ruficauda exquisita* and *Vermicella approximans*). The Pilbara endemics are largely inhabitants of rocky places or heavy stony soils; hence the local restriction of many of them to the Cape Range and the Muiron Is.

Apart from the marine turtles and sea snakes the northern component in the Shark Bay herpetofauna consisted of only five species. Not surprisingly, this component is much stronger in the Exmouth region and includes an additional 10 species: *Lophognathus g. gilberti*, *Carlia foliorum*, *Notoscincus o. ornatus*, *Sphenomorphus i. isolepis*, *Varanus acanthurus*, *Typhlina diversa*, *Aspidites melanocephalus*, *Denisonia punctata* and *Furina christieana*.

In compensation, the southern component of the fauna is much weaker in the Exmouth region and consists only of *Lerista elegans*, *L. lineopunctulata*, *L. praepedita*, *Morethia lineocellata* and *Vermicella littoralis*, compared to Shark Bay which has these and an additional 14 southern species and subspecies. In the Exmouth region southern taxa are almost wholly confined to the west coast.

Only four species and subspecies are endemic to the Exmouth region: *Diplodactylus rankini*, *Aprasia rostrata fusca*, *Ctenotus colletti rufescens* and *C. iapetus*.

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